

# Overview of Alternatives

|   | NB | Alt. 1 | Alt. 2 | Alt. 3S | Alt. 3U | Alt. 4.1S | Alt. 4.1U | Alt. 4.2S | Alt. 4.2U | Alt. 5 | Alt. 5.1 | Alt. 6 | Alt. 6.1 | Alt. 7 | Alt. 8 |
|---|----|--------|--------|---------|---------|-----------|-----------|-----------|-----------|--------|----------|--------|----------|--------|--------|
| MAPC LRTP Land Use                                | X  |        |        |         |         |           |           |           |           |        |          |        |          |        |        |
| MAPC Planned Growth Scenario                      |    | X      | X      | X       | X       | X         | X         | X         | X         | X      | X        | X      | X        | X      | X      |
| LRTP Transportation Projects (a)                  | X  | X      | X      | X       | X       | X         | X         | X         | X         | X      | X        | X      | X        | X      | X      |
| Sullivan Sq & Rutherford Ave Redesign (Surface)   | X  | X      |        | X       |         | X         |           | X         |           | ?      | ?        | ?      | ?        | ?      | ?      |
| Sullivan Sq & Rutherford Ave Redesign (Underpass) |    |        | X      |         | X       |           | X         |           | X         | ?      | ?        | ?      | ?        | ?      | ?      |
| Parking - Residential                             |    |        |        | X       | X       | -         | -         | X         | X         |        |          |        | X        |        |        |
| Employee  |    |        |        | X       | X       | X         | X         | -         | -         |        |          |        | X        |        |        |
| Bus Improvements                                  |    |        |        | X       | X       | X         | X         | X         | X         |        |          |        |          |        |        |
| TMA Shuttle                                       |    |        |        | X       | X       | X         | X         | X         | X         |        |          |        |          |        |        |
| Bike/Pedestrian                                   |    |        |        | X       | X       | X         | X         | X         | X         |        |          | X      | X        | X      |        |
| TDM - Work at Home                                |    |        |        | X       | X       | X         | X         | X         | X         |        |          |        |          |        |        |
| I-93 Improvements (Convert HOV to GP)             |    |        |        |         |         |           |           |           |           | X      | X        |        |          |        |        |
| I-93 Improvements (City Square NB On-Ramp)        |    |        |        |         |         |           |           |           |           | X      | X        |        |          |        |        |
| I-93 Improvements (Sullivan Square NB Off-Ramp)   |    |        |        |         |         |           |           |           |           | X      |          |        |          |        |        |
| Silver Line Extension (Chelsea to Kendall Sq)     |    |        |        |         |         |           |           |           |           |        |          | X      | X        |        |        |
| GLX2  |    |        |        |         |         |           |           |           |           |        |          | X      | X        |        |        |
| New Sullivan Sq Station on the Rock/Newb. CR      |    |        |        |         |         |           |           |           |           |        |          | X      | X        |        |        |
| Major Bike/Ped. (Ped Bridge Assembly To Everett)  |    |        |        |         |         |           |           |           |           |        |          |        |          | X      |        |
| New Orange Line Station at Rivers Edge (b)        |    |        |        |         |         |           |           |           |           |        |          |        |          | X      |        |
| Orange Line Spur to Everett                       |    |        |        |         |         |           |           |           |           |        |          |        |          |        | X      |

- (a) Includes 4.5 minute headways on Orange Line.  
 (b) Includes 3.0 minute headways on Orange Line.



# Alternative 1:

## Planned Growth Scenario

# Alternative 2:

## Sullivan Square/Rutherford Avenue Redesign

January 23, 2017



**LOWER MYSTIC REGIONAL WORKING GROUP**



# Alt. 1: Planned Growth Scenario (No-Build Prime)

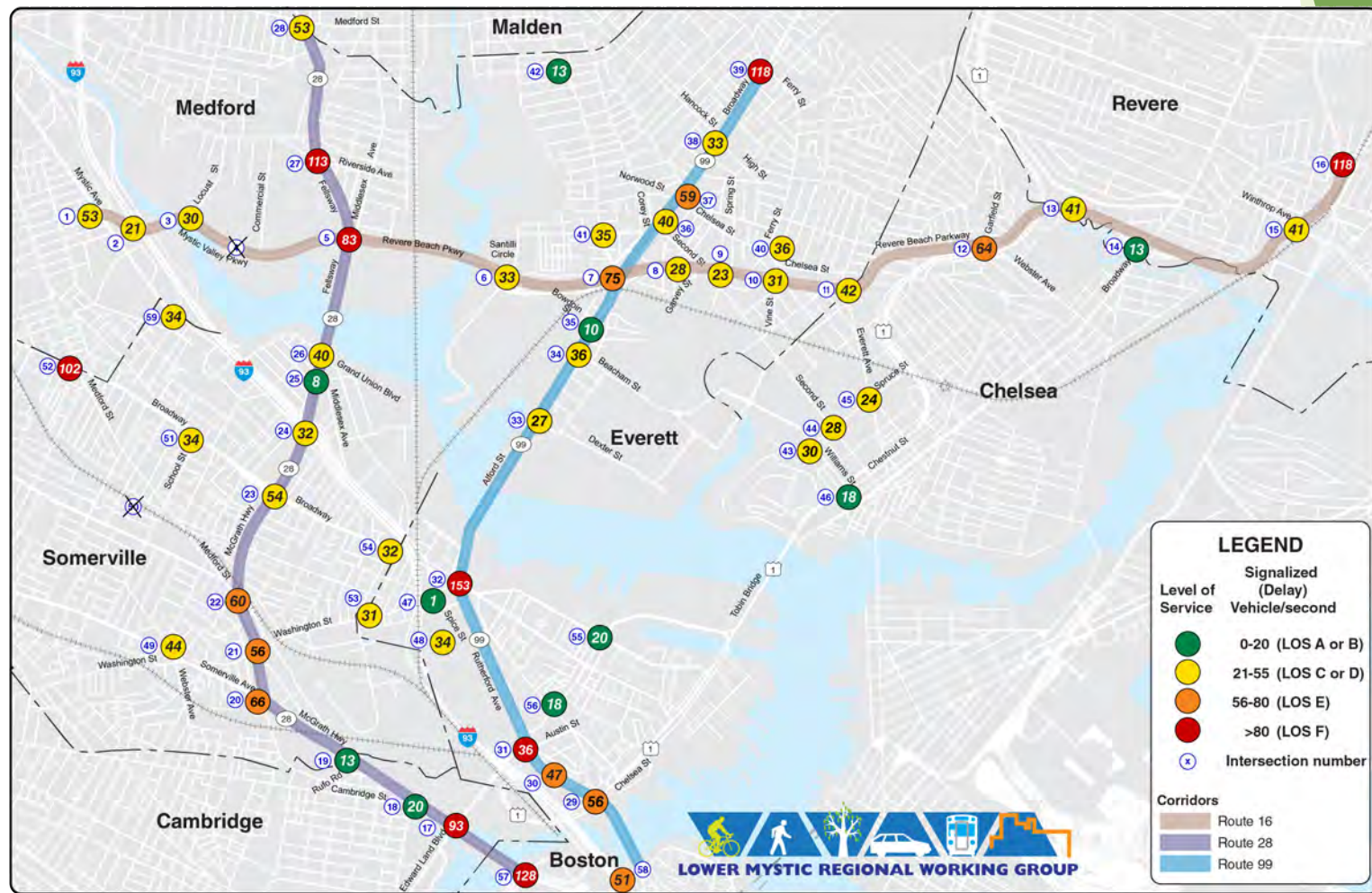
- ▶ Consistent with the Boston Region Long Range Transportation Plan Preferred Alternative
- ▶ Consistent with the TIP Process
- ▶ Consistent with LRTP land use



# Total Intersection Delay

## AM Peak Hour

### 2016 Existing Conditions

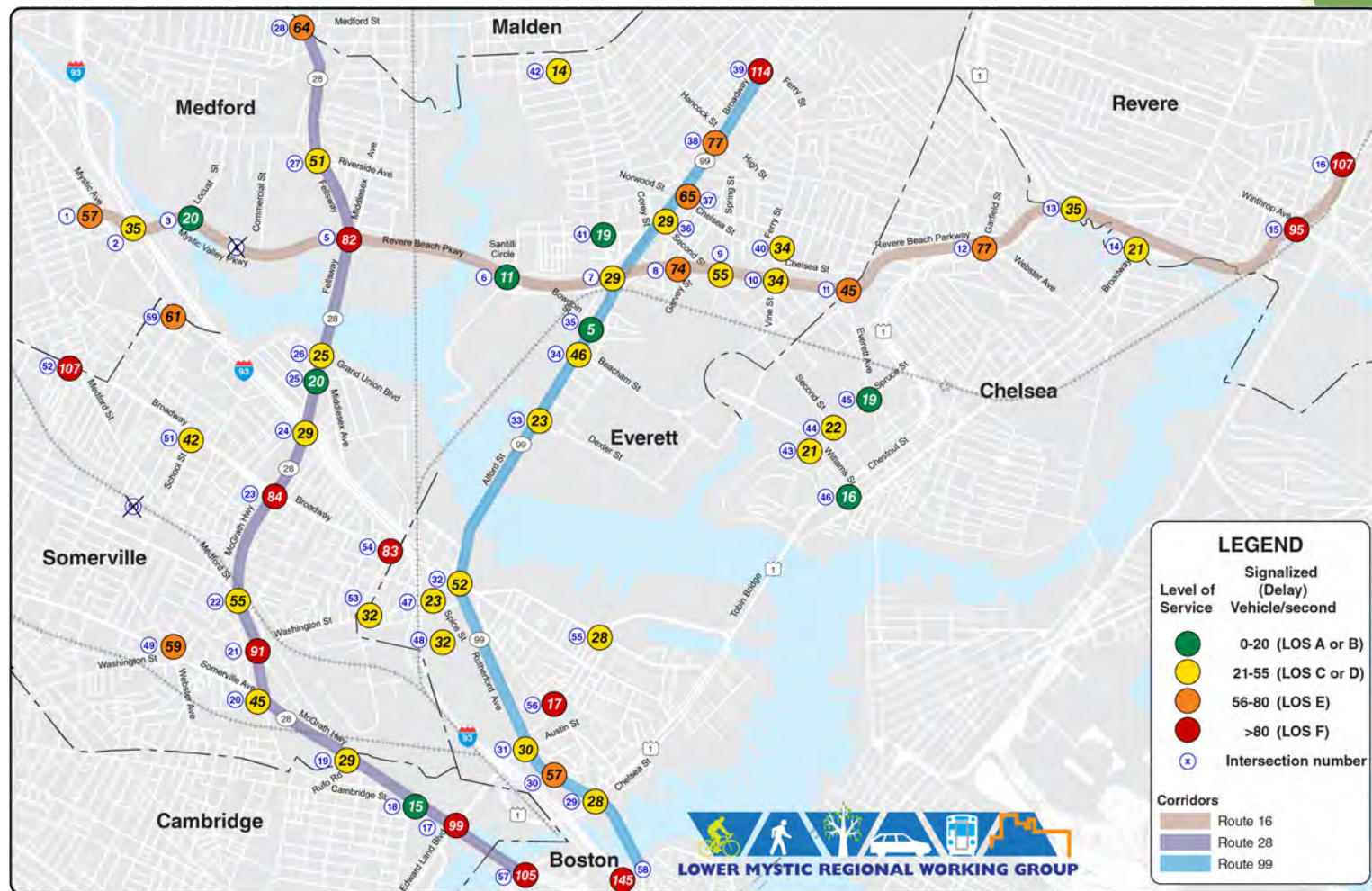




# Total Intersection Delay

## PM Peak Hour

### 2016 Existing Conditions

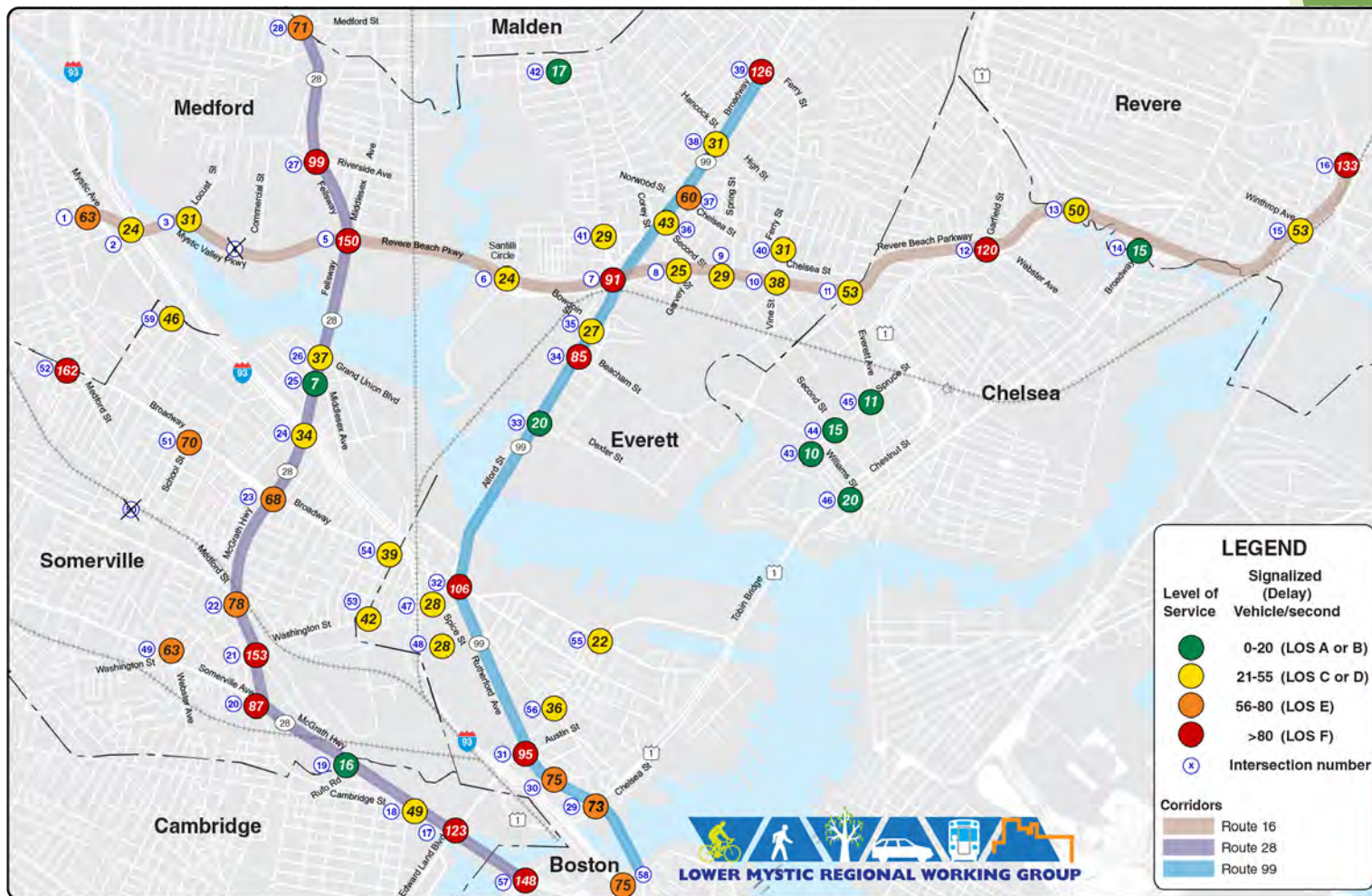




# Total Intersection Delay

## AM Peak Hour

### 2040 Alternative 1 - Planned Growth Scenario

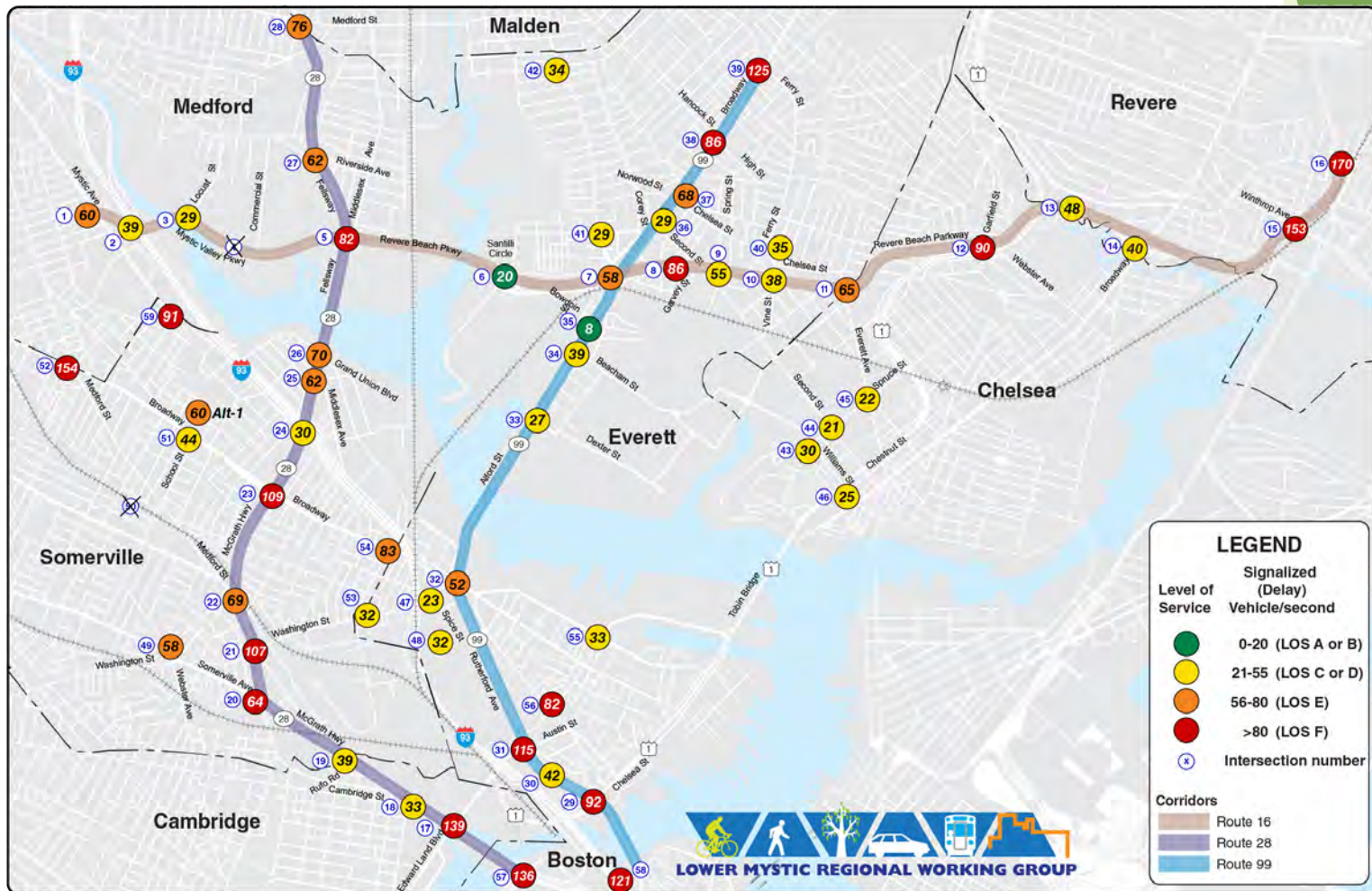




# Total Intersection Delay

## PM Peak Hour

### 2040 Alternative 1 - Planned Growth Scenario





# Alt. 2: Sullivan Square and Rutherford Avenue Redesign- Sullivan Square





# Alt. 2: Sullivan Square and Rutherford Avenue Redesign- Austin Street





# Vehicle Miles Traveled

| Mode       | AM Peak Period |                    | PM Peak Period |                    |
|------------|----------------|--------------------|----------------|--------------------|
|            | Alt. 1         | Alt. 2             | Alt. 1         | Alt. 2             |
| Boston     | 119,660        | 121,824            | 115,485        | 117,265            |
| Chelsea    | 61,300         | 60,978             | 59,431         | 58,360             |
| Revere     | 100,360        | 99,994             | 100,885        | 101,399            |
| Everett    | 44,540         | 44,896             | 47,832         | 47,867             |
| Malden     | 53,332         | 54,597             | 60,475         | 60,197             |
| Medford    | 132,283        | 130,840            | 122,877        | 122,729            |
| Somerville | 143,151        | 142,532            | 131,426        | 132,062            |
| Cambridge  | 33,914         | 33,817             | 32,523         | 32,459             |
| Total      | 688,543        | 689,483<br>(0.14%) | 670,938        | 672,342<br>(0.21%) |

\* Totals only from LMRWG study area TAZs.



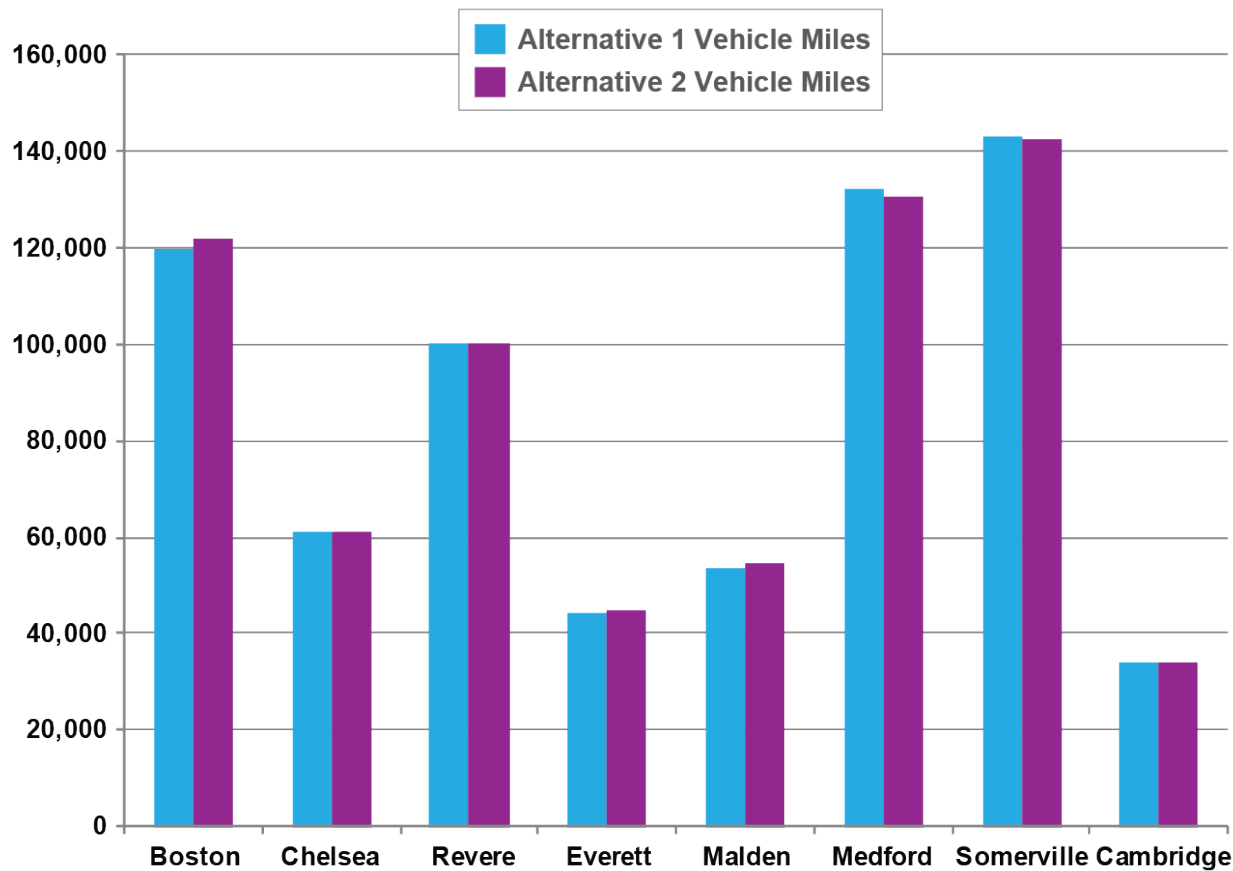
# Vehicle Miles Traveled: Focus Area

| Mode       | AM Peak Period |                    | PM Peak Period |                    |
|------------|----------------|--------------------|----------------|--------------------|
|            | Alt. 1         | Alt. 2             | Alt. 1         | Alt. 2             |
| Boston     | 91,913         | 94,083<br>(2.86%)  | 90,257         | 92,397<br>(2.37%)  |
| Everett    | 35,853         | 36,372<br>(1.45%)  | 37,401         | 37,474<br>(0.20%)  |
| Somerville | 94,897         | 94,331<br>(-0.60%) | 88,050         | 88,297<br>(0.28%)  |
| Total      | 222,664        | 224,787<br>(0.95%) | 215,709        | 218,170<br>(1.14%) |

\* Totals only from LMRWG study area TAZs.

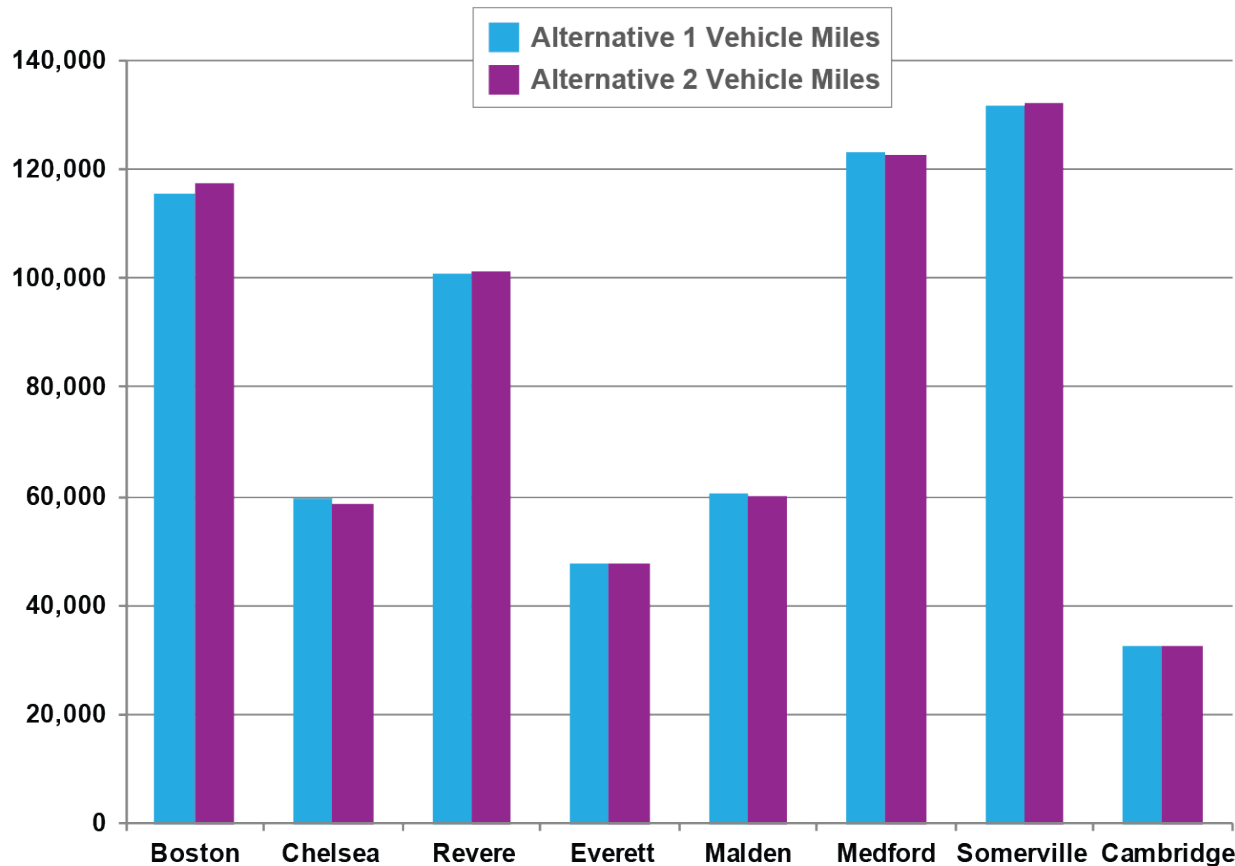


# AM Vehicle Miles Traveled (VMT)





# PM Vehicle Miles Traveled (VMT)





# Vehicle Hours Traveled

| Mode       | AM Peak Period |                    | PM Peak Period |                   |
|------------|----------------|--------------------|----------------|-------------------|
|            | Alt. 1         | Alt. 2             | Alt. 1         | Alt. 2            |
| Boston     | 6,054          | 5,758              | 5,086          | 4,987             |
| Chelsea    | 2,336          | 2,304              | 2,114          | 2,106             |
| Revere     | 4,307          | 4,113              | 4,041          | 4,174             |
| Everett    | 2,155          | 2,224              | 2,297          | 2,308             |
| Malden     | 2,402          | 2,392              | 2,922          | 2,931             |
| Medford    | 6,196          | 5,891              | 5,093          | 5,119             |
| Somerville | 6,115          | 5,981              | 5,107          | 5,249             |
| Cambridge  | 1,994          | 1,987              | 1,695          | 1,741             |
| Total      | 31,563         | 30,653<br>(-2.88%) | 28,389         | 28,618<br>(0.81%) |

\* Totals only from LMRWG study area TAZs.



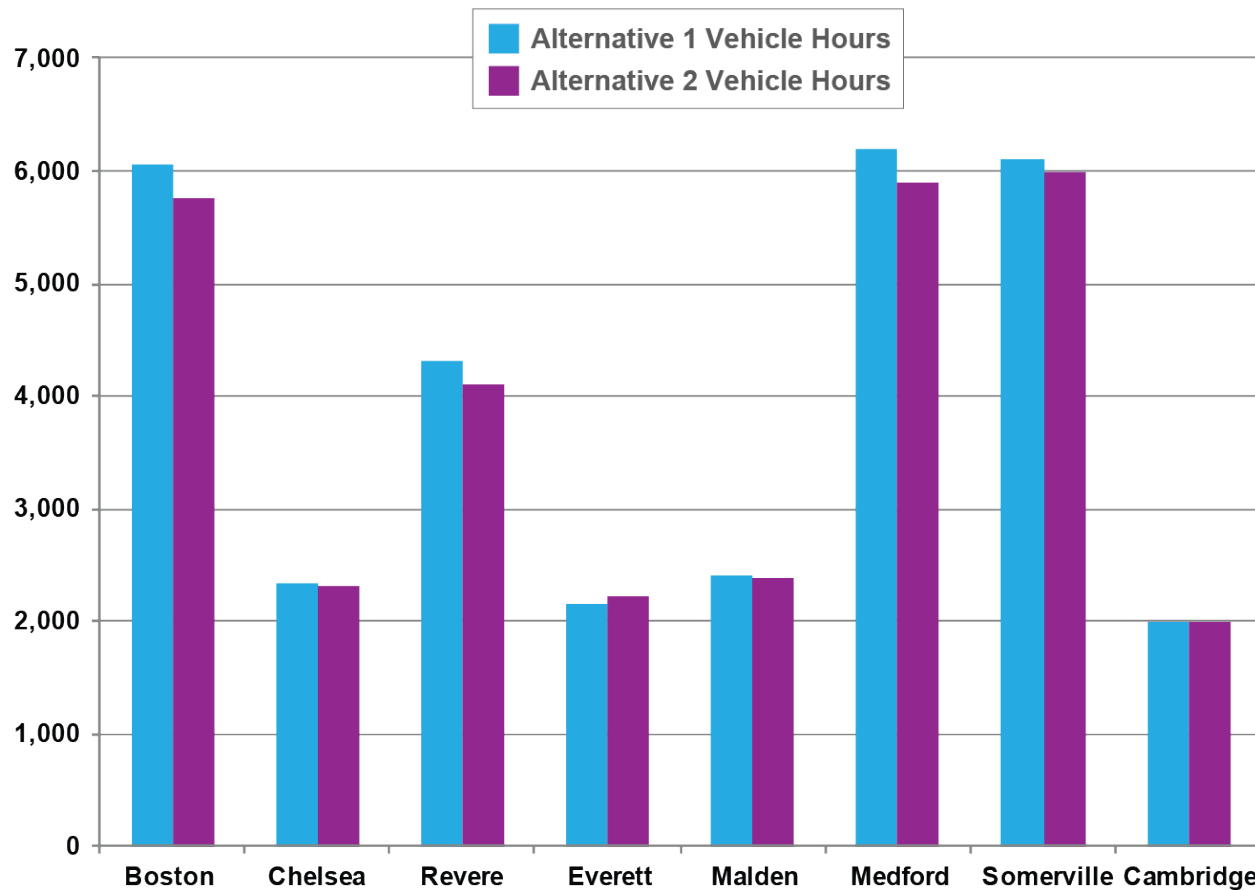
# Vehicle Hours Traveled: Focus Area

| Mode       | AM Peak Period |                   | PM Peak Period |                   |
|------------|----------------|-------------------|----------------|-------------------|
|            | Alt. 1         | Alt. 2            | Alt. 1         | Alt. 2            |
| Boston     | 4,411          | 4,133<br>(-6.30%) | 3,958          | 3,871<br>(-2.20%) |
| Everett    | 1,747          | 1,825<br>(4.46%)  | 1,790          | 1,801<br>(0.61%)  |
| Somerville | 3,987          | 3,891<br>(-2.41%) | 3,304          | 3,405<br>(3.06%)  |
| Total      | 10,146         | 9,851<br>(-2.91%) | 9,053          | 9,077<br>(0.27%)  |

\* Totals only from LMRWG study area TAZs.

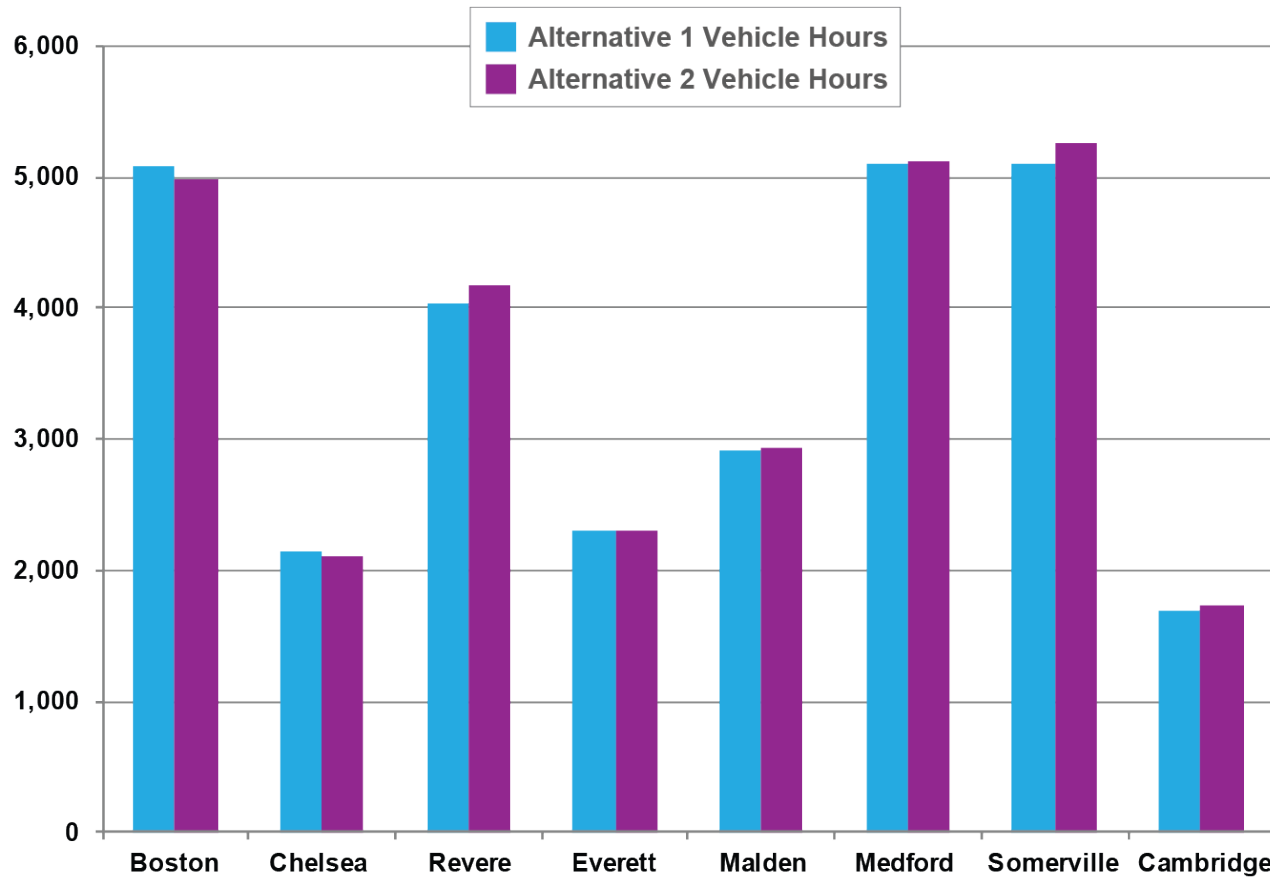


# AM Vehicle Hours Traveled (VHT)





# PM Vehicle Hours Traveled (VHT)

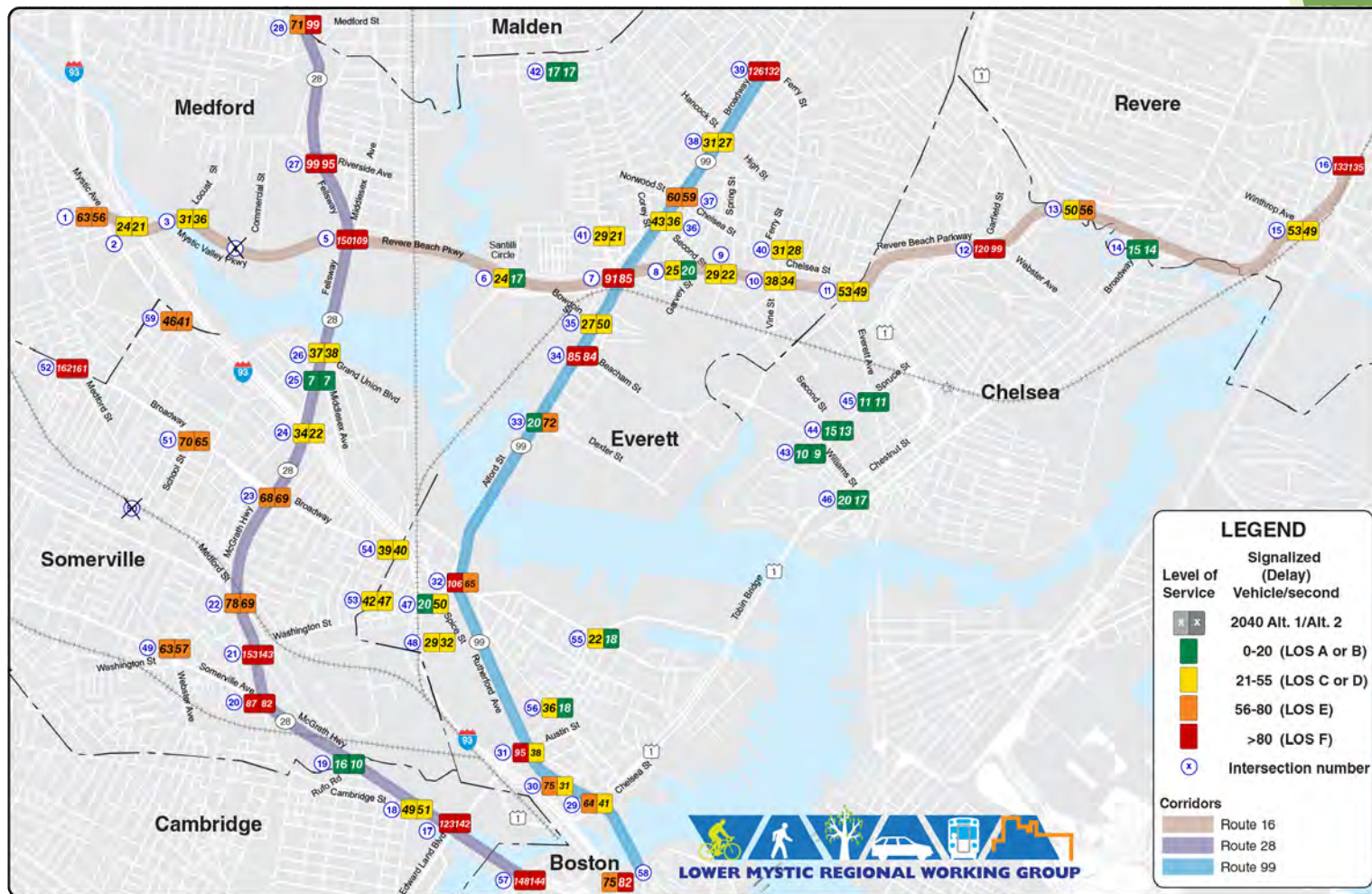




# Total Intersection Delay

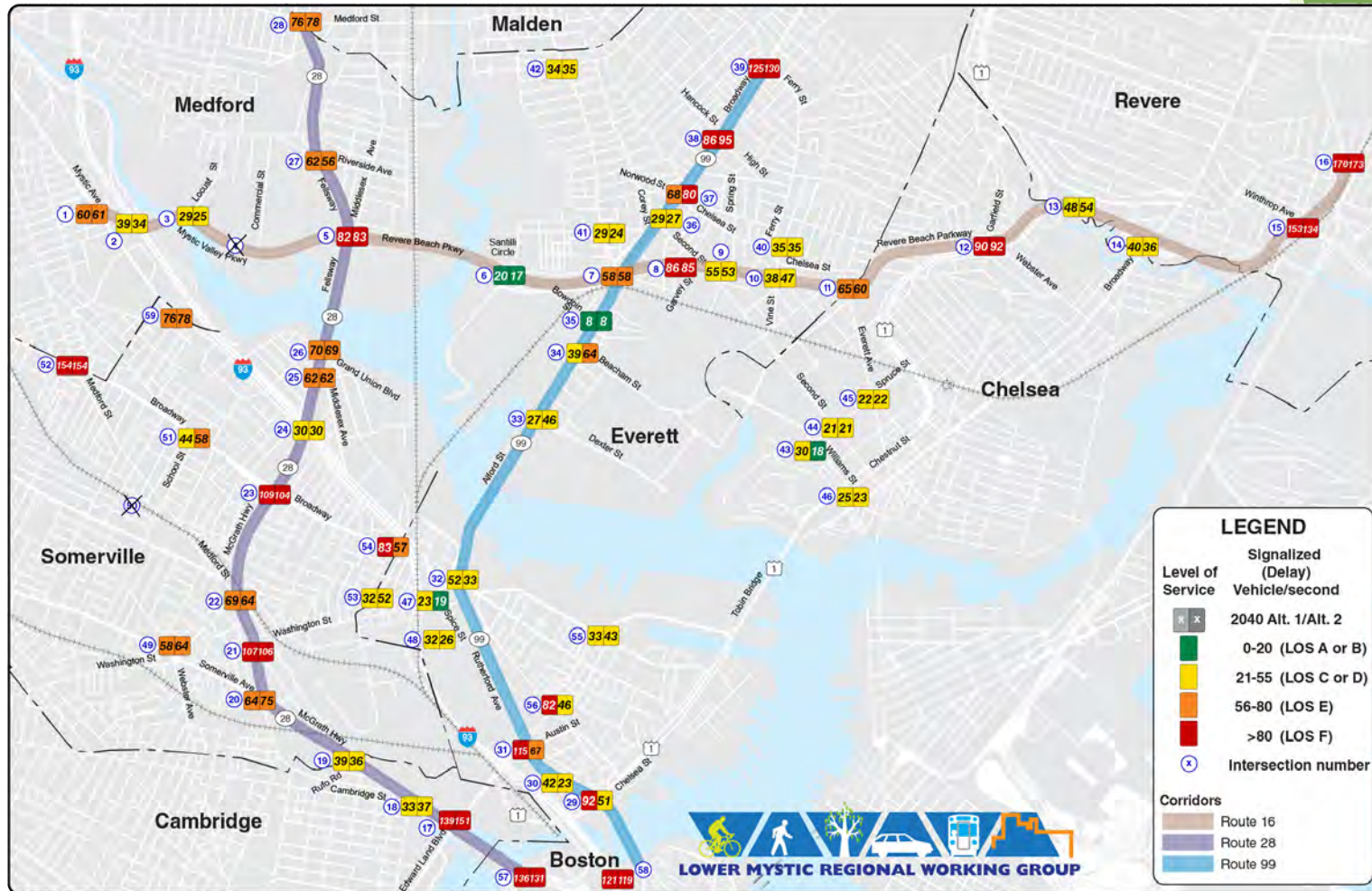
## AM Peak Hour

### 2040 Alternative 1 VS. 2040 Alternative 2



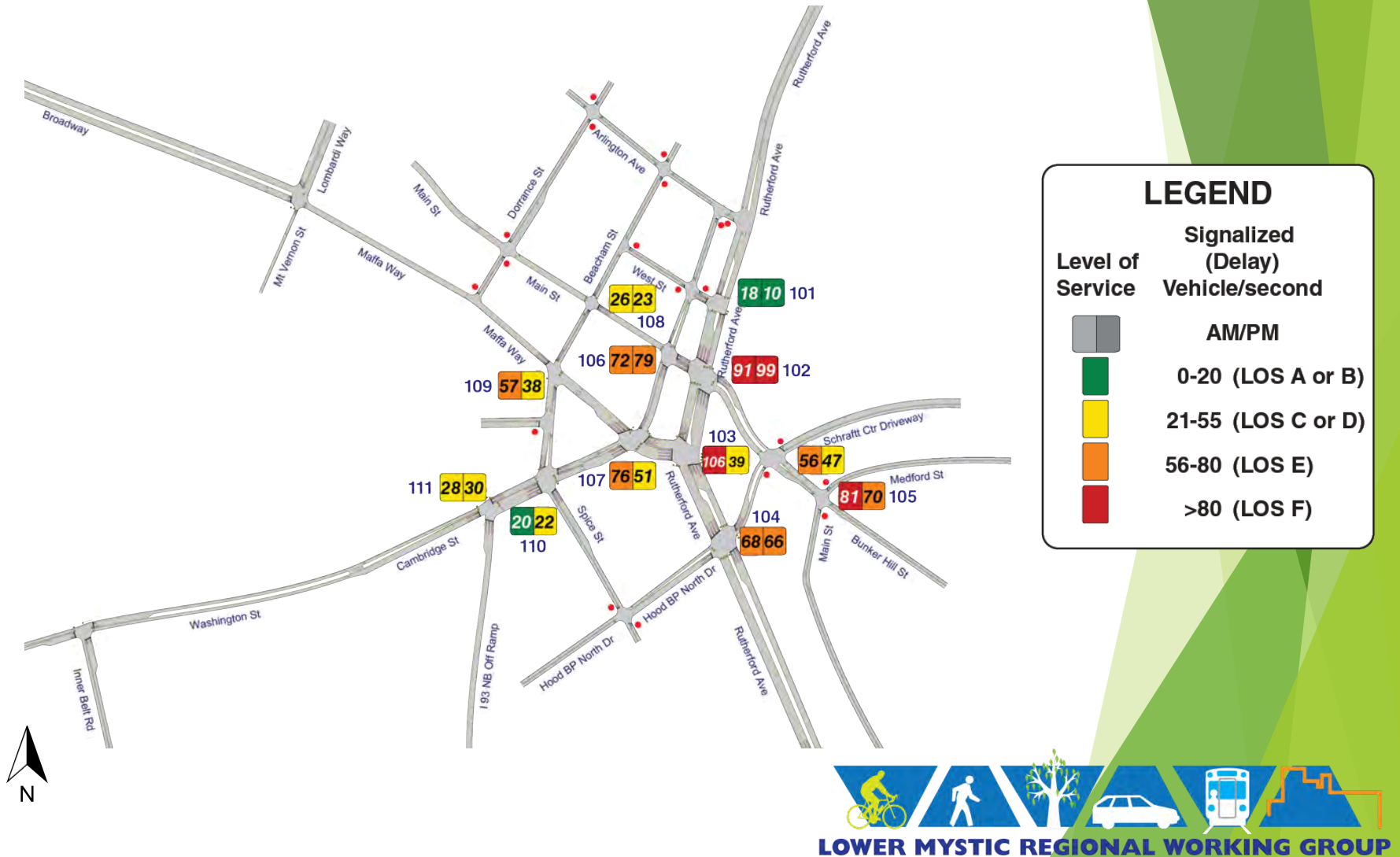


# Total Intersection Delay PM Peak Hour 2040 Alternative 1 VS. 2040 Alternative 2



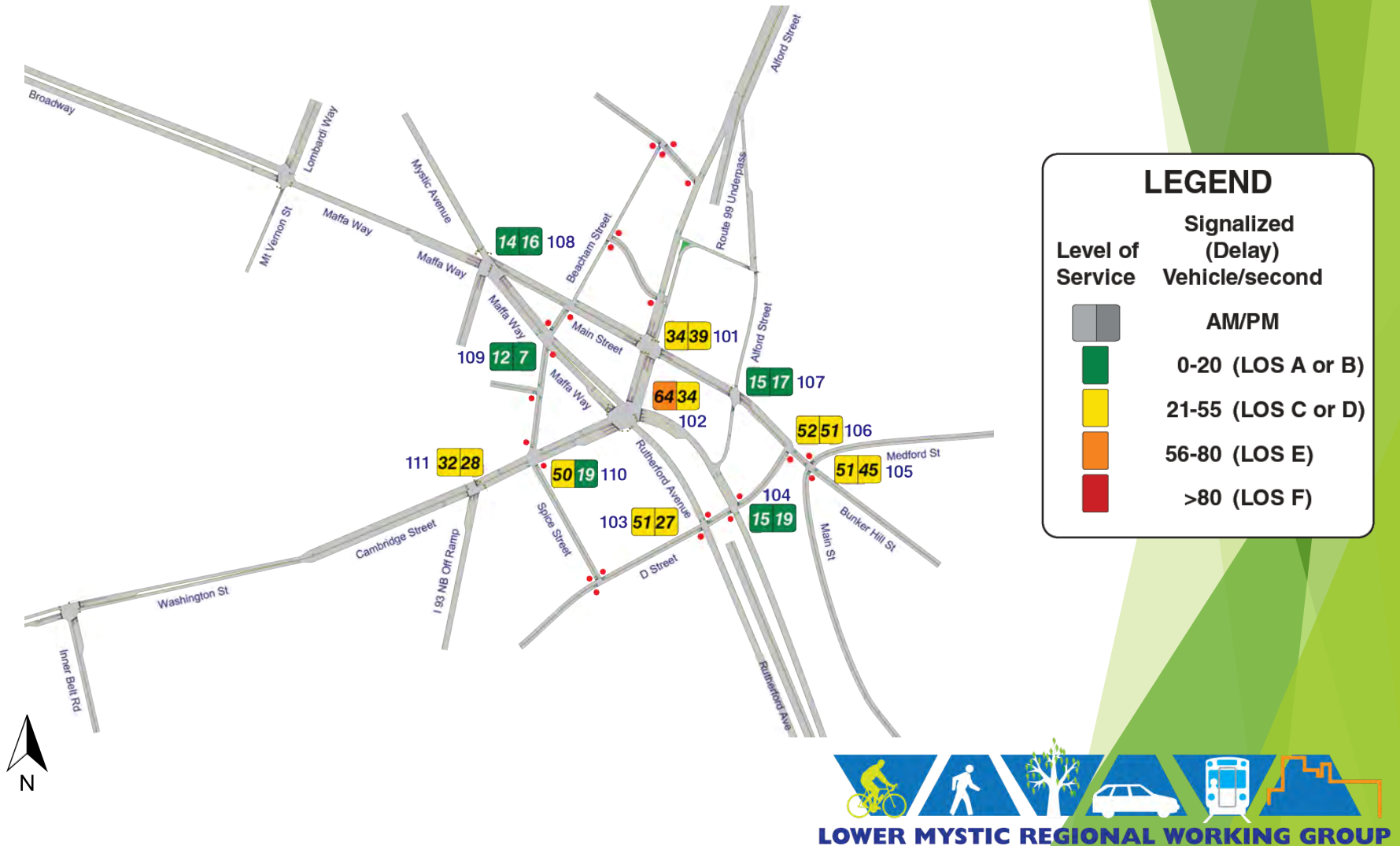


# Sullivan Square: Alternative 1



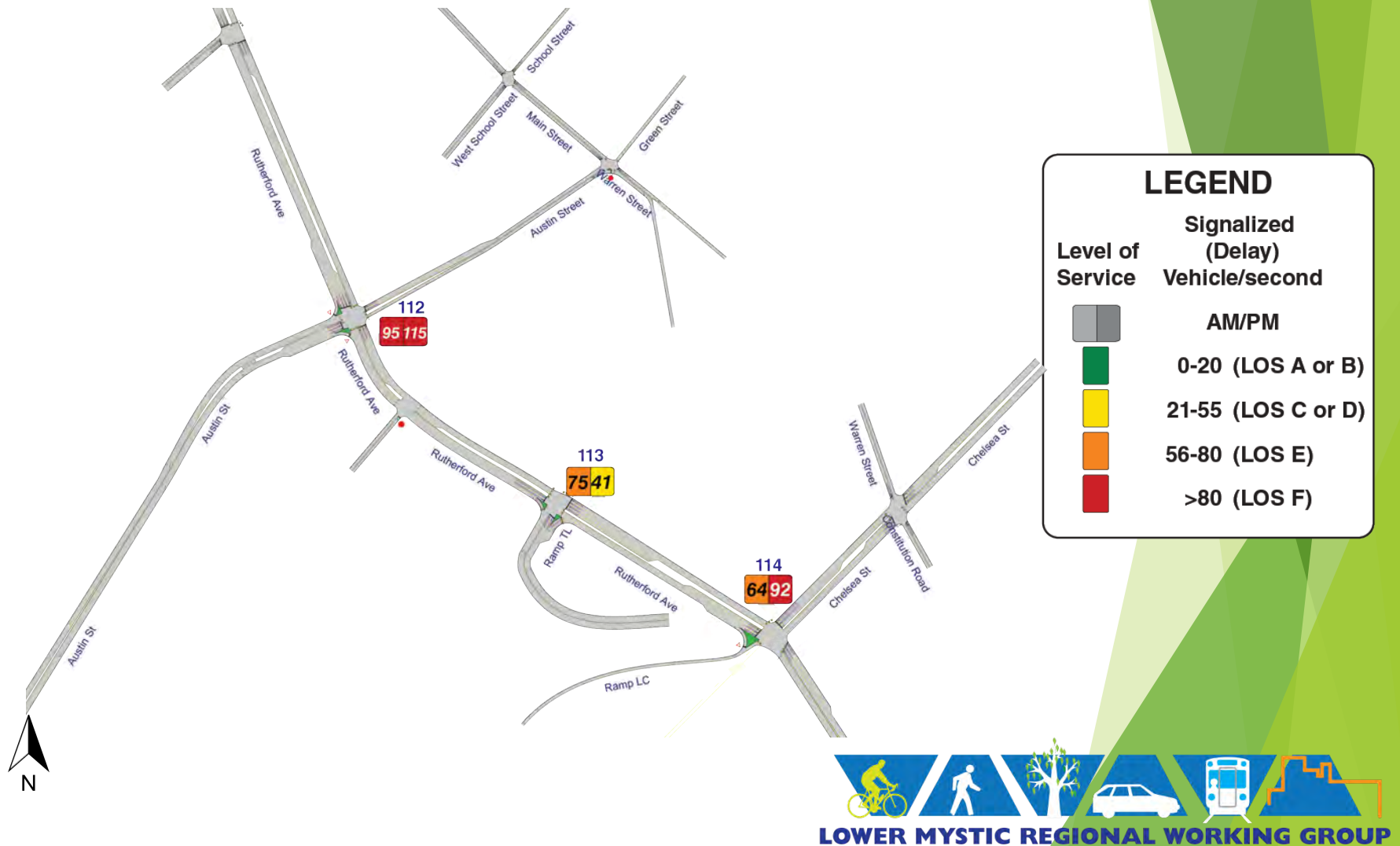


# Sullivan Square: Alternative 2



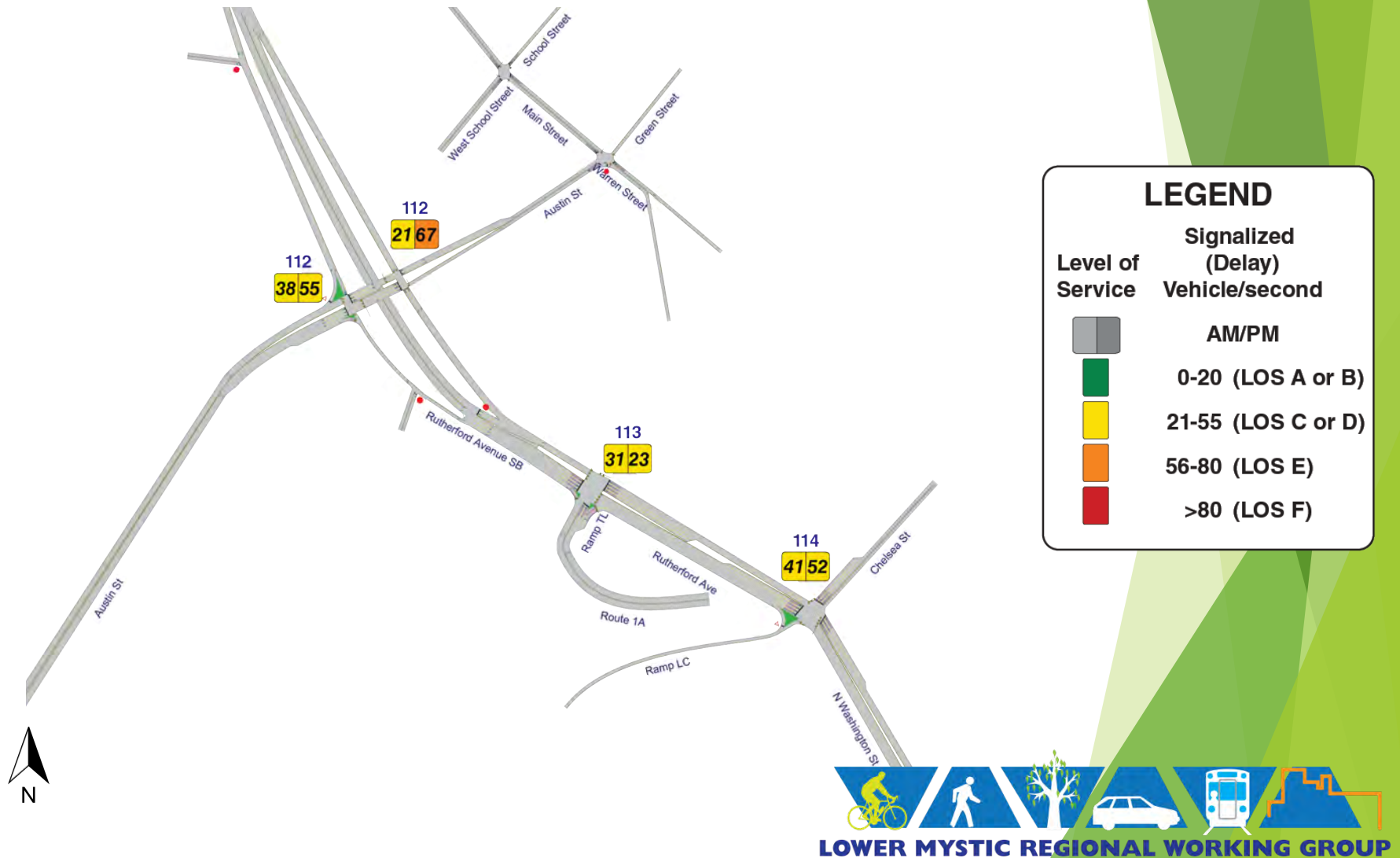


# Rutherford Avenue: Alternative 1





# Rutherford Avenue: Alternative 2





# I-93 Analysis

January 23, 2017

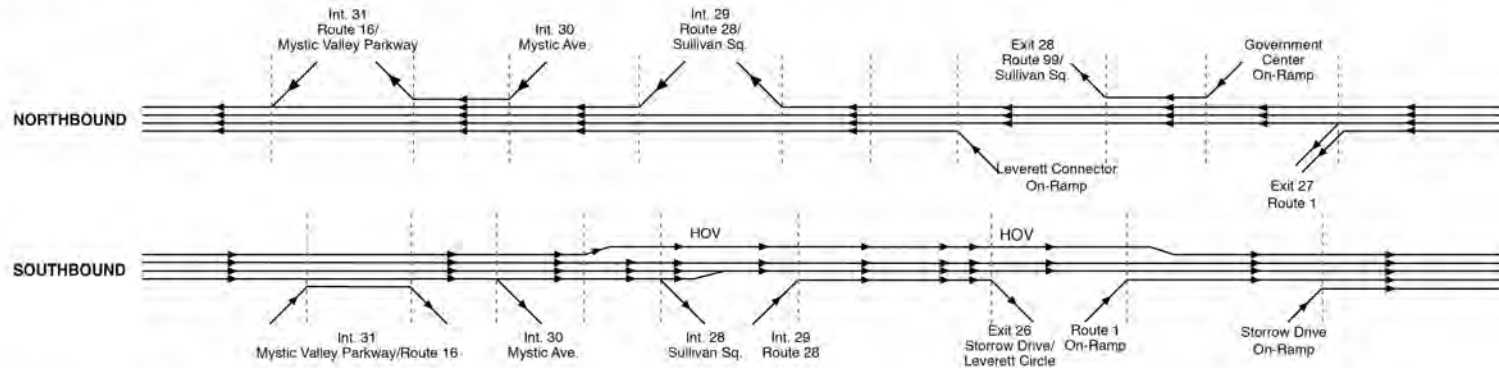


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# I-93 AM Peak-Hour Highway Capacity Analyses (Existing)

|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Average Speed (mph): | 54    | 55    | 55    | 55    | 46    | 42      | 44    | 45    | 52    | 47    | 43      |
| Density (pc/mi/ln):  | 24.5  | 25.2  | 18.0  | 15.6  | 31.3  | 42.8    | 29.4  | 32.5  | 26.7  | 30.9  | 28.4    |
| Level of Service:    | C     | C     | B     | B     | D     | E       | D     | D     | C     | D     | D       |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |



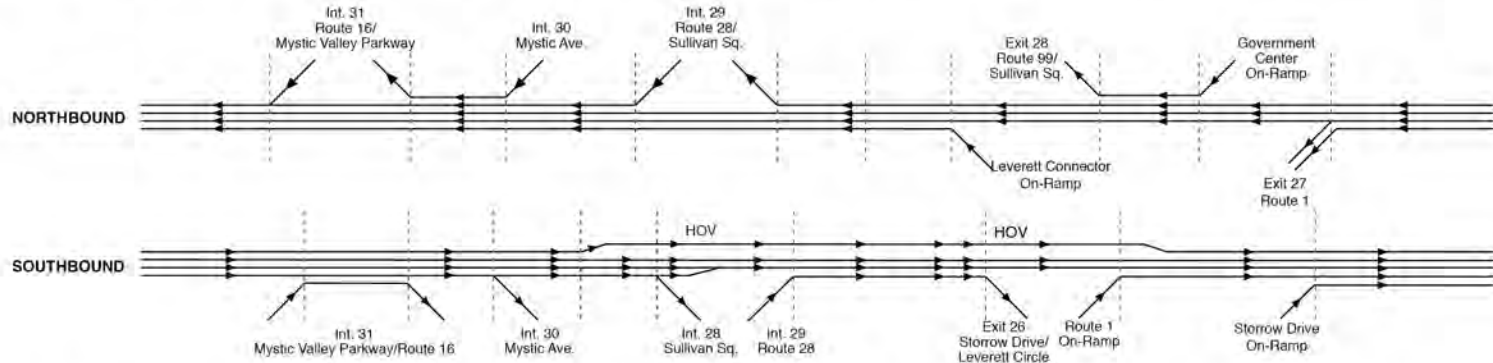
|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | E     | E     | E       | F     | E       | F     | F     | E     | E     | E     |
| Density (pc/mi/ln):  | 43.6  | 42.7  | 62.3    | 64.0  | 164.7   | 166.1 | 122.4 | 43.8  | 61.4  | 47.9  |
| Average Speed (mph): | 38    | 38    | 33      | 20    | 10      | 10    | 14    | 42    | 35    | 34    |



# I-93 PM Peak-Hour Highway Capacity Analyses (Existing)

**DRAFT**

|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Level of Service:    | E     | F     | E     | E     | F     | E       | E     | E     | E     | E     | E       |
| Density (pc/mi/ln):  | 55.5  | 51.8  | 47.9  | 43.9  | 50.6  | 46.8    | 44.2  | 43.7  | 39.6  | 45.0  | 45.4    |
| Average Speed (mph): | 40    | 40    | 39    | 41    | 41    | 41      | 42    | 43    | 42    | 42    | 40      |



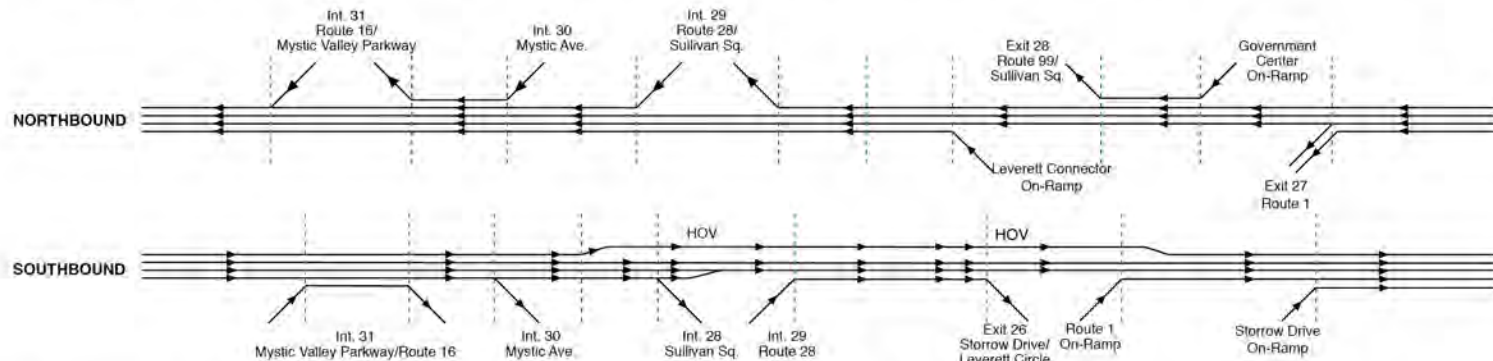
|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | D     | C     | C       | C     | C       | D     | D     | D     | E     | E     |
| Density (pc/mi/ln):  | 30.8  | 27.5  | 27.4    | 24.7  | 22.3    | 33.0  | 29.3  | 31.8  | 41.7  | 39.8  |
| Average Speed (mph): | 54    | 53    | 54      | 56    | 55      | 51    | 49    | 44    | 38    | 36    |



# I-93 AM Peak-Hour Highway Capacity Analyses (2040 Alt. 1)

DRAFT

|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Level of Service:    | C     | D     | C     | C     | D     | E       | C     | D     | C     | D     | D       |
| Density (pc/mi/ln):  | 21.5  | 24.4  | 22.5  | 22.2  | 31.9  | 40.0    | 26.6  | 32.7  | 25.8  | 33.7  | 31.9    |
| Average Speed (mph): | 55    | 54    | 54    | 54    | 46    | 42      | 44    | 45    | 51    | 45    | 43      |



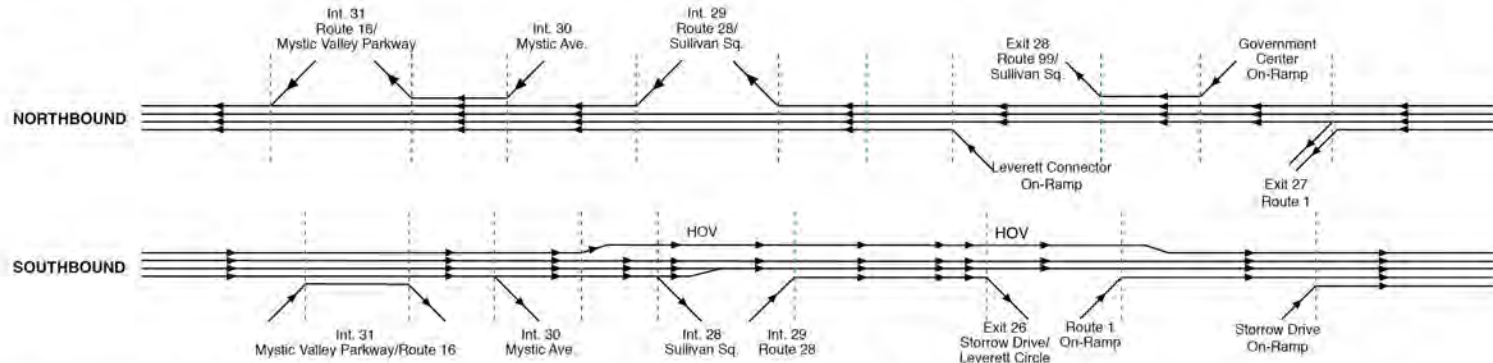
|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | F     | E     | E       | F     | F       | F     | F     | F     | E     | E     |
| Density (pc/mi/ln):  | 180.5 | 150.6 | 179.7   | 154.3 | 180.6   | 171.8 | 119.9 | 45.2  | 65.3  | 50.6  |
| Average Speed (mph): | 8     | 8     | 8       | 7     | 7       | 9     | 14    | 42    | 35    | 33    |



# I-93 PM Peak-Hour Highway Capacity Analyses (2040 Alt. 1)

DRAFT

|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Level of Service:    | E     | F     | E     | E     | E     | E       | E     | E     | E     | E     | E       |
| Density (pc/mi/ln):  | 54.0  | 46.3  | 45.8  | 44.5  | 44.8  | 45.4    | 41.6  | 40.6  | 37.9  | 42.0  | 43.6    |
| Average Speed (mph): | 41    | 40    | 41    | 41    | 41    | 41      | 42    | 43    | 43    | 42    | 40      |



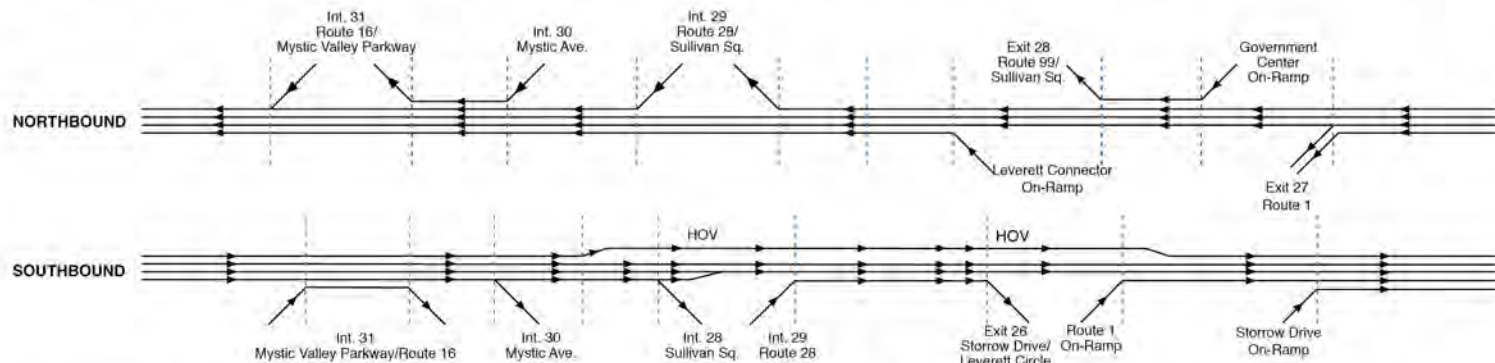
|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | D     | C     | D       | C     | C       | D     | C     | D     | E     | E     |
| Density (pc/mi/ln):  | 28.1  | 25.6  | 28.2    | 22.4  | 21.0    | 28.6  | 26.2  | 31.0  | 37.4  | 37.6  |
| Average Speed (mph): | 55    | 54    | 55      | 56    | 56      | 53    | 50    | 45    | 39    | 37    |



# I-93 AM Peak-Hour Highway Capacity Analyses (2040 Alt. 2)

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|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Level of Service:    | C     | D     | B     | C     | D     | E       | D     | D     | C     | D     | D       |
| Density (pc/mi/ln):  | 24.2  | 24.8  | 18.3  | 20.8  | 30.5  | 41.5    | 28.6  | 31.9  | 26.2  | 33.9  | 29.3    |
| Average Speed (mph): | 54    | 54    | 55    | 55    | 47    | 42      | 44    | 45    | 52    | 45    | 42      |



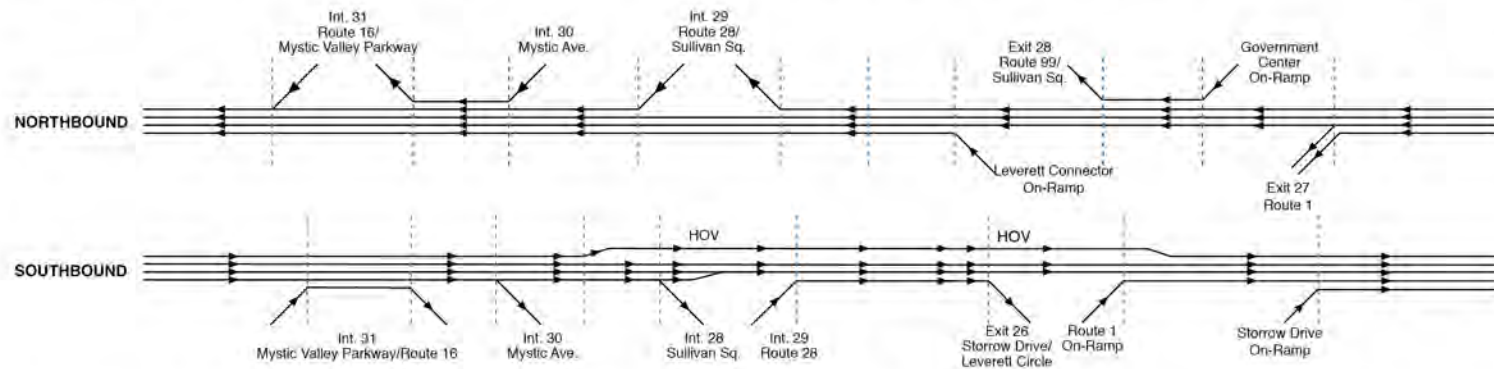
|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | F     | E     | E       | F     | F       | F     | F     | F     | E     | E     |
| Density (pc/mi/ln):  | 160.6 | 153.0 | 180.4   | 156.7 | 188.0   | 169.5 | 119.5 | 45.2  | 65.5  | 50.3  |
| Average Speed (mph): | 8     | 8     | 8       | 7     | 7       | 10    | 14    | 42    | 35    | 34    |



# I-93 PM Peak-Hour Highway Capacity Analyses (2040 Alt. 2)

**DRAFT**

|                      |       |       |       |       |       |         |       |       |       |       |         |
|----------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|
| Highway Section:     | (11)  | (10)  | (9)   | (8)   | (7)   | (6)     | (5)   | (4)   | (3)   | (2)   | (1)     |
| Analysis Type:       | Merge | Basic | Weave | Merge | Basic | Diverge | Merge | Basic | Weave | Basic | Diverge |
| Level of Service:    | E     | F     | E     | E     | E     | E       | E     | E     | E     | E     | E       |
| Density (pc/mi/ln):  | 54.3  | 46.6  | 43.6  | 43.1  | 43.9  | 42.6    | 38.5  | 38.3  | 38.6  | 38.6  | 42.3    |
| Average Speed (mph): | 41    | 40    | 41    | 41    | 42    | 42      | 43    | 44    | 43    | 42    | 40      |



|                      |       |       |         |       |         |       |       |       |       |       |
|----------------------|-------|-------|---------|-------|---------|-------|-------|-------|-------|-------|
| Highway Section:     | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)   | (8)   | (9)   | (10)  |
| Analysis Type:       | Basic | Weave | Diverge | Basic | Diverge | Basic | Weave | Basic | Merge | Merge |
| Level of Service:    | D     | C     | D       | C     | C       | D     | C     | D     | E     | E     |
| Density (pc/mi/ln):  | 29.8  | 26.6  | 29.6    | 21.7  | 23.1    | 30.8  | 26.4  | 31.4  | 40.2  | 40.3  |
| Average Speed (mph): | 55    | 54    | 54      | 56    | 55      | 53    | 50    | 45    | 38    | 36    |



Thank you

Questions and Comments